

# Review of a national flood risk assessment as a basis for developing a methodology for selected cross-border areas – BORIS project

Klaudija Lebar<sup>(1)</sup>, Simon Rusjan<sup>(1)</sup>, Andrej Vidmar<sup>(1)</sup>, Susanna Wernhart<sup>(2)</sup>, Nicola Rebora<sup>(3)</sup>, Ivana Cipranić<sup>(4)</sup>, Ela Doganay<sup>(5)</sup>, Matjaž Mikoš<sup>(1)</sup>

<sup>(1)</sup> University of Ljubljana, Faculty of Civil and Geodetic Engineering, Ljubljana, Slovenia (contact: [klaudija.lebar@fgg.uni-lj.si](mailto:klaudija.lebar@fgg.uni-lj.si))

<sup>(2)</sup> Disaster Competence Network Austria, Vienna, Austria; <sup>(3)</sup> CIMA Research Foundation, Savona, Italy

<sup>(4)</sup> University of Montenegro, Faculty of Civil Engineering, Podgorica, Montenegro; <sup>(5)</sup> Turkey Ministry of Agriculture and Forestry, Ankara, Turkey

## ABOUT THE BORIS PROJECT

**Full title:** Cross-BOrder **R**isk assessment for increased prevention and preparedness in Europe.

**Objectives:** 1) to improve preparedness and prevention in cross-border areas by developing and 2) applying a harmonised methodology and tools for both **seismic** and **flood risk** assessment for the selected cross-border areas.

**Duration:** 1st January 2021– 31st December 2022

**Project partners:**

Italian Center for Research on Risk Reduction, Italy  
Disaster Competence Network Austria (DCNA), Austria  
University of Ljubljana, Faculty of Civil and Geodetic Engineering, Slovenia  
University of Montenegro, Faculty of Civil Engineering, Montenegro  
Ministry of Interior, Disaster and Emergency Management Presidency (AFAD), Turkey

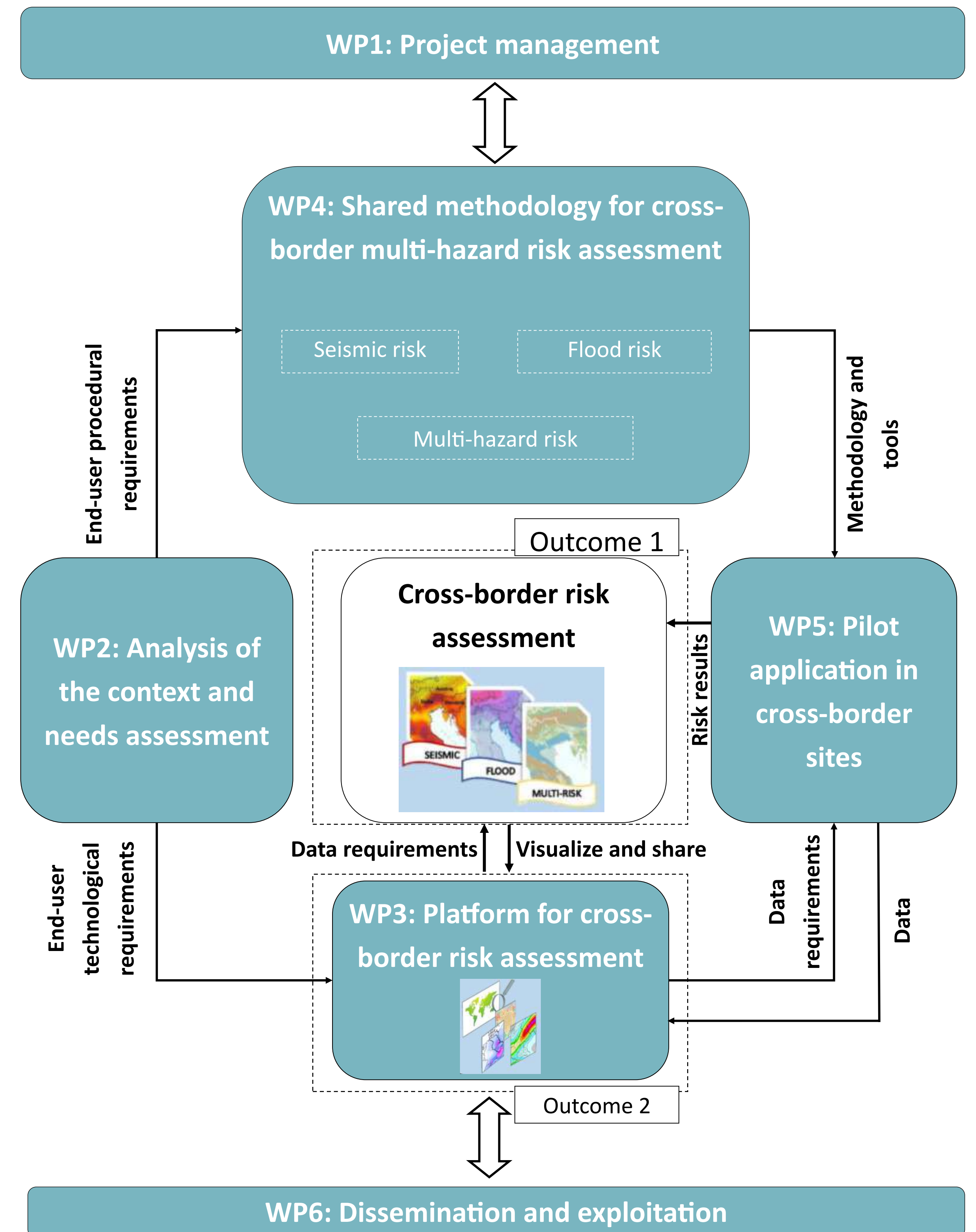


## WP2: ANALYSIS OF THE CONTEXT AND NEEDS ASSESSMENT—FLOOD RISK PART

**Activities:** Review of the available data in all countries involved in the project as well as their national methodology for flood risk assessment.

$$\text{Flood Risk} = \text{Hazard} \cdot \text{Values} \cdot \text{Vulnerability}$$

According to the general definition of flood risk (Kron, 2005), which defines the main components of risk, i.e. hazard, vulnerability, and exposure, the review was divided into two parts, namely review of national flood hazard assessment and flood vulnerability and exposure review.



## FLOOD HAZARD ASSESSMENT

Country	Intensity parameter	Return periods	Scenario considered (hazard classes)	Spatial scale of hazard maps	Data type	Projection	Source of each data layer
Slovenia	Q, h, v, product v · h (where v > 1 m/s at Q100)	10 years, 100 years, 500 years	low, medium, high, other	1:1,000 or 1:5,000 scale (preferred)	vector SHP	EPSG: 3794 or 3912	Ministry of the Environment and Spatial Planning
Italy	h, v	30 years, 100 years, 300 years	low, medium, high	1:25,000	vector SHP	EPSG: 3035	Ministry of Environment - Hydrological Districts (Unit of Management)
Austria	h, v, flood extension, product v · h	30 years, 100 years, 300 years	high, medium, low, extreme	1:25,000, in some cases 1:5,000 or more detailed	vector SHP	EPSG: 3035	Ministry of Agriculture, Regions and Tourism (BMLRT)
Turkey	Q, h, product v · h	5 years, 10 years, 50 years, 100 years, 500 years	very high, high, medium, low	1:1,000 scale (preferred) or 1:5,000	vector, raster	ITRF96 TM 3	Ministry of Environment and Urban, General Directorate of Meteorology, Directorate of Water Affairs
Montenegro	Q, h, v	10 years, 100 years, 500 years	high, medium, low	1:5,000 scale or larger scale	Digital and analogue	EPSG:3857	Water administration, Institute of Hydrometeorology and Seismology, Ministry of agriculture, Forestry and Water management, Ministry of the Interior

Q = discharge; h = water level; v = water velocity

- methodologies in all countries are based on a probabilistic approach;
- different number and types of hazard classes with only one common return period (100 years)
- different spatial scales of hazard maps and sources of data layers;
- methodologies are based on Floods Directive.

## FLOOD VULNERABILITY AND EXPOSURE

Country	Impact Indicators	Exposure elements
Slovenia	people's health	location and number of exposed people
	social infrastructure	hospitals, schools, firefighters, civil protection facilities etc.
	cultural heritage	museums, archives, libraries etc.
Italy	environment	large-scale pollution facilities (IED, SEVESO and IPPC directive, industrial and municipal landfill areas, wastewater treatment plants), areas under environmental or other protection status (NATURA 2000, water protection areas) etc.
	economic activities	type, number and characteristics of economic and non-economic activities
	infrastructure	municipal infrastructure (roads, railways, water supply systems, sewage systems, electric power systems, gas pipelines etc.)
Austria	people	number of people living in the flood area calculated as a percentage of the total population living in the census tract
	economic activities	buildings, agriculture, natural and semi-natural environments, infrastructures and strategic structures
	environment	environmental heritage
Turkey	cultural heritage	cultural-archaeological heritage
	people's health	No. of affected people/raster cell (> 100, 76–100, 51–75, 26–50, 1–25, 0)
	land use	settlement-related uses, agriculture, forestry and grassland, Water, transport infrastructure etc.
Montenegro	protected areas	water conservation areas, UNESCO world heritage sites, NATURA 2000 areas, national parks etc.
	infrastructure	contaminated site, industry, swimming water, railway station, hospitals, schools, kindergarten, senior residence etc.
	people's health	location and number of exposed people in the district
Montenegro	social infrastructure	hospitals, schools, firefighters, civil protection facilities, mosques, bus stations etc.
	cultural heritage	museums, ancient cities, libraries etc.
	environment	large-scale pollution facilities: industrial and municipal areas, wastewater treatment plants, parks, woodlands, water protection areas
Montenegro	economic activities	industrial and municipal facilities, transformers, bazaars, gas stations, high ways, bridges, railways, number and characteristics of economic and non-economic activities
	casualties	number of fatal outcomes
	severely injured/hospitalized/threatened	severely injured/hospitalized/threatened: water pollution; poor sanitary and hygienic conditions may lead to epidemic outbreak; overflowing cesspits may lead to germ infestation
Montenegro	basic needs	employees could not go to work, children to schools and kindergartens, inability to receive health care etc.
	evacuation	number of interventions carried out by civil protection service etc.
	economic activities	damage to individual properties, devastation of agricultural land, damage to family houses etc.
Montenegro	environment	increase of water levels in rivers and groundwater which leads to their pollution due to wastewater spills, removal and damage of agricultural land etc.
	disrupted everyday life	interruptions in water supply, interruptions and difficult functioning of traffic infrastructure etc.
	cultural heritage	loss of cultural heritage

- impact indicators can be grouped into four to eight categories;
- different spatial resolutions of flood risk.

## FUTURE ACTIVITIES

- platform for cross-border risk assessment;
- guidelines for cross-border risk assessment: Shared framework for single and multi-hazard risk assessment at cross-border sites;
- pilot application of developed methodology in cross-border sites (Slovenia-Italy, Slovenia-Austria);
- workshops on multi-hazard risk assessment in cross-border areas (Austria, Slovenia, Italy);
- trainings for the operational usage of the digital platform ...

## FIND OUT MORE



### Deliverable 2.1: Comparison of National Risk Assessments

In the report, the national risk assessments (NRAs) from Slovenia, Italy, Austria, Turkey, and Montenegro are summarised. Each section addressing a NRA comprises the analysed risks, seismic risk assessment, flood risk assessment and multi-hazard risk assessment.



### Deliverable 2.2: Data availability and needs for large scale and cross-border risk assessment, obstacles and solutions

In the report, detailed information on data availability and needs for large scale and cross-border risk assessment, together with specific obstacles and possible solutions, are provided.

